



Arizona Prosecuting Attorneys' Advisory Council

2015 APAAC Annual Legal
Assistant Conference

The Arizona DPS Rapid DNA Program



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Two Phases of AZ Rapid DNA Program

External

- Officers Trained to operate the Rapid-Hit 200
- Officers Analyze samples for direct comparison or search against AZ DNA Database (AZ DB)

Internal

- Database Unit Hit Confirmations
- Database analysis of Arrestee and Convicted Offender Samples
- Forensic Casework Knowns

The Arizona DPS Rapid DNA Program

- What this talk is....
 - Overview of the External Program
 - Training and network setup

The Arizona DPS Rapid DNA Program

- What this talk is....
 - Overview of the External Program
 - Training and network setup
- What this talk isn't....
 - Cost Benefit Analysis
 - Review of the validation

Rapid DNA External Uses

- Upload of Arrestee and Convicted Offender profiles at intake to a database (CODIS or other database)
- Provide Investigative Leads to Law Enforcement from forensic samples
- Identification of Victims
- Identification of apprehended individuals (comparison to forensic unknowns)

Rapid DNA External Uses

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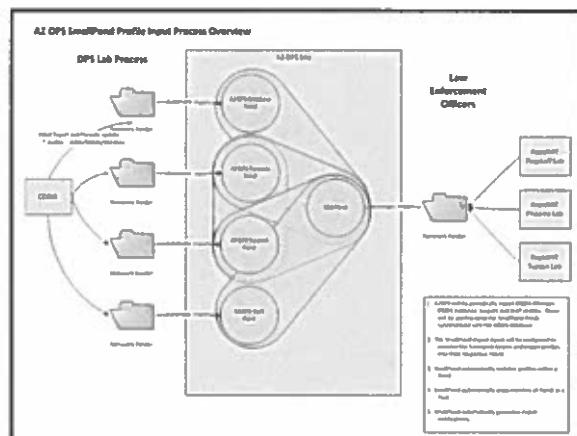
Arizona DNA Database Network

Why?

- Quickly provide IL's to Law Enforcement
- Large number of backlogged DNA cases
 - >4,000 Property Crimes
- If we didn't do it, someone else (LEA's) would

Arizona DNA Database Network

- IntegenX RapidHit 200's in three AZDPS locations
 - Colocated with Phoenix, Tucson, and Flagstaff Laboratories
 - Accesible to officers
- Connected to the AZ DB secure, closed network
- SmallPond software housing the AZ DB
- Synchronized with AZ SDIS



Arizona DNA Database Network

- RH200 profiles are placed in the Law Enforcement Pond
- Samples in all "Pooled" ponds are searched against each other as profiles are added
- Profiles do not get copied or moved between ponds

Arizona DNA Database Network

- Flexible search control
- Additional ponds can be added to the same pool or a different pool can be established
- Can Link to other external ponds
 - MOU required

Arizona DNA Database Network

- Instrument & Software
 - IntegenX RapidHit 200
 - SmallPond Software
 - Custom search interface for IL information

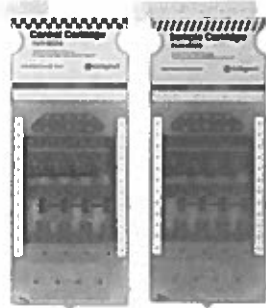
RapidHit 200 Instrument



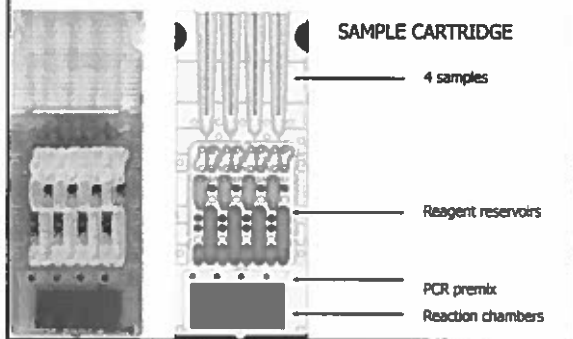
RapidHit 200 Instrument

- Cost
 - \$270,000 for the RapidHit 200
 - \$1,750 for each set of cartridges
 - \$350 per sample for 5 samples

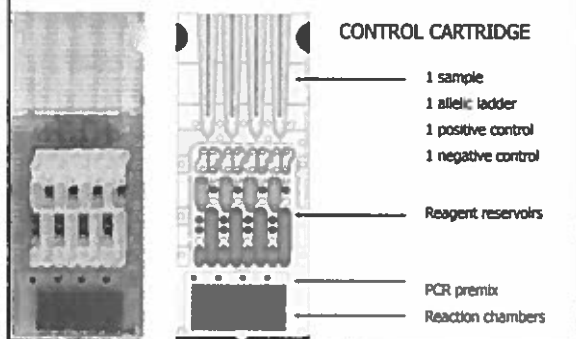
RapidHit 200 Instrument



RapidHit 200 Instrument



RapidHit 200 Instrument



RapidHit 200 Instrument

DNA extraction processes



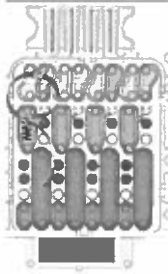
DNA Extraction from sample swabs

- Extraction solution in the reservoirs is MOVed to sample swabs and agitated with air
- Lysed cells are pumped from the sample wells through the chip to the bead chamber, which is pre-loaded with paramagnetic beads

IntegenX

RapidHit 200 Instrument

DNA extraction processes



DNA capture on magnetic beads

- Bead chambers are pre-packed with beads
- Lysis solution is mixed with the beads
- Beads/DNA are engaged by magnets
- Lysis solution is transferred to waste receptacle

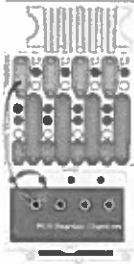
Two bead washes with ethanol

- Ethanol pumped into bead chamber from each of two reservoirs
- Agitation by air
- Wash solution dumped to waste receptacle

IntegenX

RapidHit 200 Instrument

DNA extraction processes



PCR reaction preparation

- Washed DNA is transferred to the PCR reaction chamber on beads
- PCR premix is added to the reaction chamber

PCR amplification

- Thermal cyclers engage
- Amplification 30 cycles, approx 15 minutes

1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16

IntegenX

RapidHit 200 Instrument

Rapid DNA – a comprehensive microfluidic solution

Electrophoresis

- Diluted reaction fills the cathode, stops for a 15 second electrophoresis at 4 kV, and quickly gets flushed with copious amounts of buffer
- Electrophoresis occurs at 8 kV for approximately 20 minutes
- Capillary length is 28 cm to the detection window



IntegenX

SmallPond™ DNA Profile Matching System

Department of Public Safety

Home Cases Profiles Matching

Cases

Results

See your fully searchable results

Personal Profile 122,291
Unsubmitted Profiles 0
Conversations 18,264,493,320
Matches 0

Suspects

See your fully searchable suspect profiles

Personal Profile 11,625
Unsubmitted Profiles 0
Conversations 16,371,376
Matches 0

Rapid DNA

See your fully searchable results

Personal Profile 0
Unsubmitted Profiles 0
Conversations 0
Matches 0

SmallPond™ DNA Profile Matching System

Department of Public Safety

Home Cases Profiles Matching


My Cases

Add Case

☐ Show Closed Cases

	Case ID	Status	Entry Date	Criminal Offense	Total	Spent money			
						Net	In	Out	Per
					Ver	Lab			
1	12	Open	05/01/2010	1454 Breach of entering building	1	1	0	0	0

Items per page: 25



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§ 8-8 (3-4-08 Section 1)

Arizona DNA Identification System Specimen Lookup

Specimen ID:

First Name	MIA	Last Name	Gender
BOB	BOB	BOB	BOB

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Arizona DNA Database Network

Officer Training

Arizona DNA Database Network

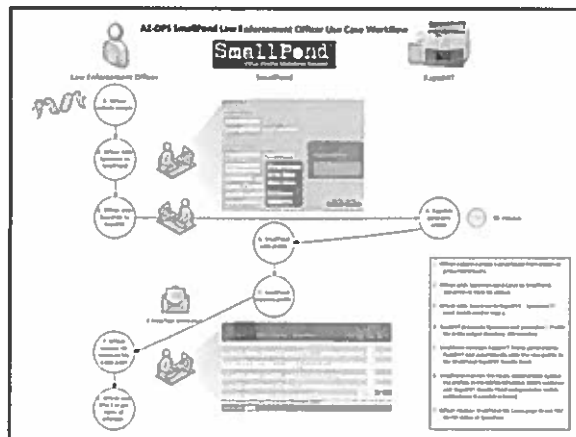
Officer Training

- 10 officers
- 3 RH200 Instruments
- Four day training class

Arizona DNA Database Network

Officer Training

- Presumed single source samples
 - Blood
 - Saliva
- Must be enough sample for follow up analysis in the lab



Performance Objectives

At the completion of this course the student will demonstrate:

- An understanding of basic biology
- An understanding of basic DNA analysis
- An understanding of identification of appropriate samples for analysis on the RapidHit 200 instrument

Final Outcome of Course

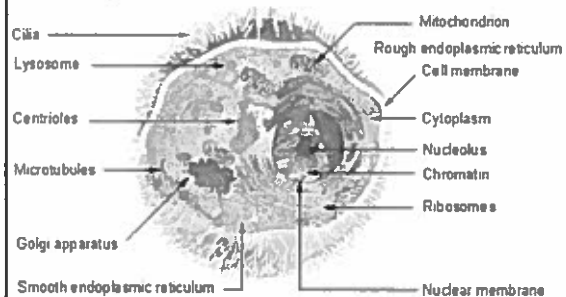
Students successfully completing the course will be qualified to use the RapidHit 200 instrument and SmallPond database as an Investigative tool to develop potential ILs

PO 1 – Basic Biology

- Structure of cells
 - Protected by cell membrane
 - Filled with cytoplasm
 - Made up of numerous organelles with specific functions
 - Two specific organelles important for DNA analysis
 - Nucleus
 - Mitochondria

PO 1 – Basic Biology

Cell Structure



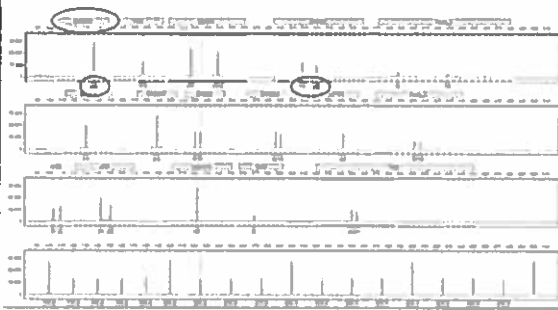
PO 5 – DNA Databases

- CODIS

- Major Indices

- Offender – sample collected from someone that has committed a felony, is on parole, or is required by law to give one
 - Forensic – sample attributed to a crime scene
 - Arrestee – sample collected from a person arrested for a qualifying crime

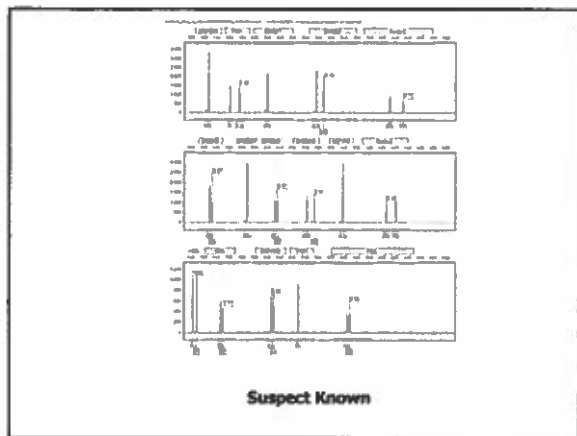
PO 6 – Evaluation/Interpretation of DNA Results

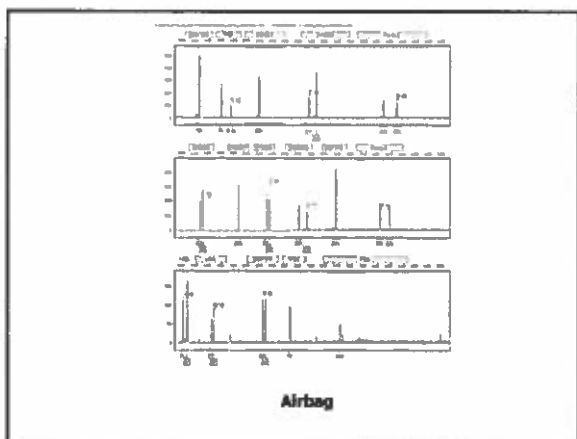


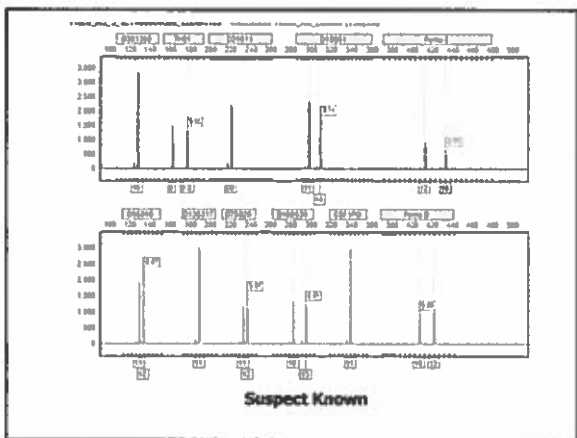
The Arizona DPS Rapid DNA Program

- First Case

- One vehicle accident with two unrestrained passengers
 - Blood on airbag







The Arizona DPS Rapid DNA Program

- Future Plans....
 - Additional Training Classes
 - Test Case
 - Statewide Deployment

The Arizona DPS Rapid DNA Program Acknowledgements

- Scott Rex, DNA Lab Manager
- Kathy Press, DNA Casework Technical Lead
- Jennifer Kochanski, DNA Property Crimes Supervisor
- Mark Smith, Lab Information Systems Administrator
- Randy Johnson, Assistant Superintendent
- Dave Duplissa, DNA Database Supervisor/Tech Lead
- Lt. Col. Jeff Raynor, Assistant Director DPS (my boss)
